REMARKS

The Office Action of February 20, 2009, is acknowledged. In response, Applicants submit the following remarks, which fully address the Examiner's rejection of Claims 1-5, 17, 18, 20, and 28-33 and objection to Claims 6-16 and 19. Applicants acknowledge that Claims 21-27 are allowed. Reconsideration of the application is respectfully requested.

Claim rejections under 35 U.S.C. §102

Claims 1-5, 17, 18, 20, and 28-33 are rejected under 35 USC §102(e) as being unpatentable over U.S. Patent No. 7,130,262 to Cortez et al. (hereinafter "Cortez"). In view of the arguments presented herein, Applicants respectfully submit that the Application is in condition for allowance.

Cortez discloses a method of setting up a new circuit in a network using an optimization method. The optimization method makes a new service path or restores an existing service path by determining the optimal path from an origin node to a destination node. (col. 3, ll. 40-57; Figs. 1, 4A-C). The optimal path applies algorithms, such as the Dykstra Algorithm, which finds the shortest path between the origin node and destination node. Each link is assigned a weighted value and the algorithm uses the weighted values to optimize each path. (col. 4, ll. 13-19, 65-67; col. 5, ll. 1-3; Figs. 1, 3B). The method of Cortez determines the optimal path by comparing all the possible paths using the weighted values corresponding to each of the paths. (col. 5, ll. 49-55;

Figs. 4A-C). Essentially, Cortez discloses a method for determining one optimal path from each originating node to each destination using an algorithm that compares multiple paths and selects the one optimal path for each origin node and destination node pair.

Applicants' invention is a tool for network administrators to analyze and assess the capability of existing and proposed network topologies. Applicants' invention maintains service continuity in the presence of faults and reduces costs of network operation and/or an imbalance of link utilization. The method uses the existing paths and adds additional links in preparation for a link failure. (para. [0024]). The additional links allow the network traffic to continue flowing when a node fails by routing the traffic to avoid failed nodes. (para. [0031]). The method also adjusts link weights to reduce the costs of network operation and/or imbalance in link utilization. (paras. [0023], [0036], [0038]).

Specifically, Claim 1 defines a method for increasing the capability of a network topology model having a plurality of nodes connected by existing links to maintain service continuity in the presence of faults. The method first includes adding new links to the network topology model to protect against single node failures. The method next includes adjusting link weights for the network topology model to reduce at least one of a cost of network operation, and an imbalance in link utilization.

Claim 17 further defines a method for adding new links to a network topology model having a plurality of nodes connected by existing links to achieve protection against single node failures for Open Shortest Path First (OSPF) and Multiprotocol Label Switching (MPLS) based local recovery. The method includes the steps of: (a) failing one of the plurality of nodes in the network topology; (b) calculating a first number of disconnected node pairs; (c) selecting a pair of nodes which are neighbors to the failed node; (d) adding a new link between the pair of nodes; (e) calculating a second number of disconnected node pairs; (f) retaining the new link and setting the first number equal to the second number when the second number is less than the first number; (g) repeating steps (c) through (f) for randomly selected combination of pair of nodes until the first number equals zero; (h) repeating steps (a) through (g) for each of the plurality of nodes in the network topology as modified by the addition of the retained links; (i) removing one of the plurality of retained links in the modified network topology; (j) restoring the removed link when the removal causes any node pair to become disconnected for any single node failure; and (k) repeating steps (i) through (k) for each of the plurality of retained new links in the modified network topology.

Claim 18 further defines a method for adjusting link weights for a network topology model having a plurality of nodes connected by links to reduce the cost of network operation. The method includes the steps of: (a) unmarking each link in the network topology; (b) calculating a network cost for operating the current network topology based upon a link cost

associated with each link; (c) incrementing the weight of the unmarked link in the current network topology having the maximum link cost to modify the network topology; (d) calculating a network cost for operating the modified network topology; (e) restoring the weight and marking the link having the maximum link cost when the network cost for operating the modified network topology is greater than or equal to the network cost for operating the current network topology; and (f) repeating steps (b) through (e) until each of the links in the network topology is marked.

Claim 20 further defines a method for adding links to a network topology model having a plurality of nodes connected by existing links to reduce the cost of network operation. The method includes the steps of: (a) selecting a maximum number of potential links to be added to the network topology; (b) selecting a maximum number of new links to be added to the network topology; (c) finding a potential link that when added to the current network topology will result in a maximum reduction in the cost of network operation; (d) adding the potential link to the current network topology; (e) repeating steps (c) and (d) until the maximum number of potential links have been added to the current network topology; (f) finding the potential link that when removed from the current network topology will result in the lowest cost of network operation; (g) removing the potential link from the current network topology; (h) repeating steps (f) and (g) until the maximum number of potential links is reduced to the maximum number of new links to be added to the network topology.

Claim 28 further defines an article of manufacture for increasing the capability of a network topology model having a plurality of nodes connected by existing links to maintain service continuity in the presence of faults. The article including a machine readable medium containing one or more programs which when executed implement the following steps: (a) adding new links to the network topology model to protect against single node failures; and (b) adjusting link weights for the network topology model to reduce at least one of a cost of network operation, and an imbalance in link utilizations.

Claim 33 further defines an apparatus for increasing the capability of a network topology model having a plurality of nodes connected by existing links to maintain service continuity in the presence of faults. The apparatus includes a network topology analyzing unit. The network topology analyzing unit is configured to: (a) add new links to the network topology model to protect against single node failures; and (b) adjust link weights for the network topology model to reduce at least one of a cost of network operation, and an imbalance in link utilizations.

In contrast to Claims 1, 17, 18, 20, 28, and 33, Cortez provides a method for setting up links between each origin node and destination node. The method then compares the paths along the links of the network and selects one optimal path for each origin node and destination node pair. Cortez further provides a method for restoring the network after a link fails by starting at an origin node and determining one optimal path to the destination node. The optimal path to

restore the network is basically determined using the same method as a new path is set up. The only difference is that the restoration path may be set up using a different set of assigned weight values. Cortez fails to provide a method for analyzing a network topology model with the method of adding additional links to an existing path prior to a node failure.

With respect to independent Claims 1, 17, 20, 28, and 33, Applicants' invention adds additional links to the nodes in the network. The additional links protect against single node failures by providing the additional links which enable traffic to continue on the path even when a link becomes disconnected (paras. [0025]-[0033]; Figs. 1A-B). Hence, the additional links add to the number of links that were initially created for paths on the network. (paras. [0025]-[0026]; Fig. 1A). By providing additional links, failure of a node will not require the network to search for an entirely new path, because the traffic will continue to flow along the additional links, which are designed to avoid disconnect between the existing paths. (para. [0031]).

Cortez further fails to provide a method for adjusting individual link weights in the network topology model to reduce the cost of network operation and/or an imbalance in link utilization. The method of Cortez is designed to optimize the path by selecting a path based on, for example, the lowest cost as determined by the weight values of each link. Accordingly, Cortez adds together the weights for each link along possible paths and determines which path

would have the lowest total weight. The paths use the assigned weights to determine the optimal path and will change links, not readjust weight values, to find the optimal path.

Contrary to Cortez, Claims 1, 18, 28, and 33 of Applicants' invention adjusts or changes the weight values for one or more of the individual links. (paras. [0034]-[0038]). When the weight values are adjusted, the flows of network traffic along the paths in the network are optimized. (para. [0036]). Thus, the weight adjustments reduce the overall costs to operate the network and/or reduce imbalance in link utilization. (paras. [0034]-[0036]). Thus, Applicants' invention adjusts the weight values by assigning new weight values to links for the purpose of optimizing paths, opposed to Cortez, which optimizes paths by selecting links with more favorable weight values assigned to the links in each path.

With reference to independent Claims 1, 17, 18, 20, 28, and 33, Cortez suffers the deficiencies noted above. Claims 2-5 and 29-32 depend from Claims 1, 17, 18, 20, and 28, respectively. It is respectfully submitted that Claims 1-5, 17, 18, 20, and 28-33 are patentable over Cortez.

Advantages of Applicants' invention include the ability to analyze and assess the network topology and optimize the network's efficiency by adding additional links and adjusting link weight values. The advantage of this invention includes ability to configure the network to avoid reduction in network operation due to a node failure. (paras. [0025], [0033]). A further

advantage is the ability to route traffic to different nodes when one or more links provide a large cost or create an imbalance in link utilization. (paras. [0034]-[0036]). Thus, Applicants' invention is not only distinguishable from the prior art, but provides additional and beneficial features not available in the prior art.

Therefore, it is respectfully requested that the rejection of Claims 1-5, 17, 18, 20, and 28-33 under 35 U.S.C. §102(e) be reconsidered and withdrawn.

Allowable Subject Matter

Applicants note with appreciation that at page 7 of the Office Action, Claims 21-27 are allowed.

Furthermore, Applicants note with appreciation that at page 7, the Examiner also indicated that Claims 6-16 and 19, which depend from Claims 1 and 18, respectively, would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims. Having shown that independent Claims 1 and 18 and all intervening dependant claims are patentable, it is respectfully submitted that the objection to Claims 6-16 and 19 should be withdrawn since the objected to Claims 6-16 and 19 are in condition for allowance.

Conclusion

Accordingly, it is respectfully submitted that independent Claims 1, 17, 18, 20, 28, and 33 are patentably distinct over the cited combination of references. Therefore, Claims 1, 17, 18, 20, 28, and 33, as well as dependant Claims 2-5 and 29-32, which depend therefrom, define patentable subject matter over the art. Claims 6-16 and 19 are objected to, but in view of the arguments herein, are in condition for allowance. Claims 21-27 are allowed. Having responded in full to the present Office Action, it is respectfully submitted that the application is in condition for allowance and favorable action thereon is respectfully solicited.

The Commissioner is hereby authorized to charge payment of any additional fees associated with this communication, or credit any overpayment, to Deposit Account No. 08-2461. Such authorization includes authorization to charge fees for extensions of time, if any, under 37 C.F.R § 1.17 and also should be treated as a constructive petition for an extension of time in this reply or any future reply pursuant to 37 C.F.R. § 1.136.

Should the Examiner have any questions regarding this submission, please contact the undersigned counsel at the telephone number below.

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